Brief Report

Nicotine Replacement Therapy Use at Home After Use During a Hospitalization

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Abstract

Introduction: We assessed whether providing inpatient smokers with nicotine replacement therapy (NRT) to relieve withdrawal symptoms while hospitalized was associated with self-initiated NRT use soon after hospital discharge.

Methods: We conducted an observational study of 1,895 cigarette smokers admitted to a large hospital over 24 months (July 2007 through June 2009) and seen by a tobacco counselor during hospitalization. Participants were surveyed at 2 weeks after discharge to assess postdischarge NRT use. We calculated adjusted rate ratios (ARRs) for the effect of NRT use in the hospital on the rate of NRT use after discharge, adjusting for gender, age, hospital service, intention to quit, baseline smoking level, length of stay, and counseling duration.

Results: 62 percent (1,166/1,895) of enrolled participants received NRT during hospitalization. The survey response rate was 72%. 42 percent (544/1,293) of survey respondents reported initiating postdischarge NRT use within 2 weeks of discharge. NRT use after discharge was more likely to be reported by those who used it in hospital whether they had ever used it prior to hospitalization (ARR: 5.64, 95% CI: 3.95–8.05) or had never used it before (ARR: 4.68, 95% CI: 3.25–6.73).

Conclusions: Smokers who received NRT during a hospitalization were more likely to use it after discharge compared with those who did not use NRT in hospital. By encouraging use of this effective cessation aid, supplementing counseling with NRT for hospitalized smokers may promote smoking cessation efforts after discharge.

Introduction

Quitting smoking reduces morbidity and mortality and is one of the most cost-effective preventive health interventions (Fiore, Jaen, Baker, Bailey, Benowitz, Curry, et al., 2008). A hospital admission provides a good opportunity to encourage a smoker to quit. Illness may heighten a smoker's perceived vulnerability

to the harms of tobacco use, increasing motivation to quit at a moment when abstinence is enforced by a hospital smoking ban (Rigotti, Munafo, & Stead, 2007). However, abrupt tobacco abstinence precipitated by a hospital admission can provoke nicotine withdrawal symptoms (American Psychiatric Association, 2000). Clinical guidelines recommend offering hospitalized smokers nicotine replacement therapy (NRT), which is effective in alleviating these symptoms (Fiore et al., 2008).

NRT has been shown in clinical trials to be a safe and effective smoking cessation aid that increases the odds of long-term abstinence by 50%–70% in outpatients when used for 8–12 weeks (Stead, Perera, Bullen, Mant, & Lancaster, 2008). However, less than a third of smokers report having used NRT in their last quit attempt (Shiffman, Brockwell, Pillitteri, & Gitchell, 2008). The low rate of NRT use may be partly due to misapprehensions about NRT. Endorsement of false beliefs about NRT, specifically that it is not safer than smoking, that it is addictive and that it is not effective are common and are associated with not having used the medication in the past and not planning to use it in future quit attempts (Shiffman, Ferguson, Rohay, & Gitchell, 2008).

The practice of providing pharmacotherapy to hospitalized smokers may help correct common misunderstandings about NRT. When NRT is offered by hospital staff, patients are assured that the medication is not only safe but also safe for them, given their current health problem. If they accept the offer, they can experience firsthand its ability to reduce withdrawal symptoms and they may receive counseling that will give them greater confidence in the medication and their ability to use it properly. As a result, those who use NRT in hospital may be encouraged to use NRT at home if they attempt to remain abstinent after discharge.

To characterize the use of NRT during and after a hospitalization, we conducted an observational study of smokers who were admitted to a large hospital and routinely referred to its tobacco treatment service (TTS). Patients received counseling and medication recommendations while hospitalized and were followed for 2 weeks after discharge to assess NRT use. Our

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hypothesis was that the patients who used NRT in hospital would be more likely to initiate use after discharge in an attempt to quit smoking.

Methods

Setting and Participants

This study was reviewed and approved by the Partners Healthcare System Institutional Review Board. It was conducted at Massachusetts General Hospital, a 900-bed teaching hospital in Boston, MA. Physicians in the medical, neurology, and surgical services admit inpatients using a computerized order entry system that prompts them to record smoking status and facilitates ordering of NRT at admission. Smokers identified this way are electronically referred to the TTS regardless of their interest in quitting smoking. Patients may also be referred by phone or fax at any time during hospitalization. Counselors, certified tobacco treatment specialists, see patients at the bedside to help them manage nicotine withdrawal symptoms and encourage them to remain abstinent from tobacco after discharge. Counselors recommend pharmacotherapy use during hospitalization if needed for withdrawal symptoms and make postdischarge recommendations for those interested in quitting.

Participants referred to the TTS during a 24-month period (July 2007 through June 2009) who had smoked cigarettes in the past week and received bedside counseling were eligible for enrollment. Patients were excluded if they received only brief advice about smoking cessation, defined as ≤ 5 min of counseling, had no telephone access, altered mental status, limited English skills or another communication barrier, or were not discharged to home.

Procedure

Baseline Data Collection

After each counseling session, counselors recorded the participant's admitting service, average number of cigarettes smoked per day (cig/day) during the month before admission, use of NRT for smoking cessation before the current hospitalization (prior use), and counseling session duration (in minutes). Intention to quit was assessed by asking about the participant's plan about smoking after hospital discharge. Response options were: "I will remain quit," "I will try to quit," "I don't know if I will quit," and "I do not plan to quit." Age, gender, length of stay (LOS), and pharmacy orders for NRT were obtained from hospital records. Consent to telephone follow-up was obtained after counseling.

Follow-up Data Collection

Participants were contacted by telephone at 2 weeks after discharge to assess whether NRT had been used since discharge.

Analysis

All analyses were conducted using Stata statistical software (StataCorp, 2008). Baseline differences by NRT use during hospitalization were compared using chi-squared tests, *t* tests, and Wilcoxon rank sum tests. Cigarettes per day were dichotomized as <10 versus ≥ 10 , contrasting light versus heavier smokers. Duration of counseling was dichotomized at the median (≤ 25 vs. >25 min). Intention to quit was classified as "I will remain quit" (the

strongest intention to quit) versus other responses. Admitting service was categorized as cardiac versus other. LOS was log transformed.

We assessed the effects of NRT experience in hospital on NRT use after discharge in a generalized linear model (GLM) using a Poisson distribution, log link function, and robust *SEs*. To separate the effects of NRT use before and during the current hospitalization, respondents were divided into four mutually exclusive categories of NRT use before discharge: (a) never (not before or during hospitalization), (b) before the current hospitalization only, (c) during hospitalization only, and (d) both before and during hospitalization. We calculated rate ratios (RR) and adjusted rate ratios (ARRs) with 95% *CI* for self-reported postdischarge NRT use for each NRT use category using those who had never used NRT before discharge (Group 1) as the reference. Multiple imputation, implemented in Stata using a chained equation approach (Royston, 2004), was used to retain cases missing baseline data (cig/day, prior use of NRT, or intention to quit) in this analysis.

Results

Enrollment and Follow-up Rates

During the study period, 2,338 eligible patients were counseled; 1,895 (81%) consented to be followed and were enrolled. The follow-up response rate was 72% (1,293/1,789), excluding those deceased ($N = 6$), reached but too ill to complete the telephone assessment ($N = 75$), or readmitted to our hospital and re-referred to the TTS before the follow-up ($N = 25$).

Baseline Characteristics

Sixty-two percent (1,166/1,895) of the participants received NRT in hospital. Nearly all NRT users received transdermal patches (94%); 16% received combination therapy, usually patch plus lozenge (8%) or gum (7%). Table 1 presents baseline characteristics. Characteristics associated with receiving NRT in hospital were male gender, baseline smoking level, use of NRT before hospitalization, weaker intention to quit, greater LOS, and longer duration of counseling in the hospital. Participants with previous experience with NRT were older (53 vs. 51 years, $p = .003$), had shorter stays (median: 4 vs. 5 days, $p = .02$), and received more bedside counseling (25 vs. 22 min, $p < .001$) but were otherwise similar to those with no prior NRT use (data not shown).

NRT Use After Hospital Discharge

NRT use after hospital discharge was reported by 42% (544/1,293). In bivariate analyses, NRT was more likely to be used after discharge by those who had used it in hospital (58% vs. 17%, $p < .001$), who had used it before admission (51% vs. 34%, $p < .001$), who smoked at least 10 cig/day (46% vs. 26%, $p < .001$), and who received more than 25 minutes counseling in hospital (51% vs. 36%, $p < .001$). In bivariate analyses, there were no differences by NRT use after discharge in gender, age, intention to quit, admitting service, or LOS.

The GLM is presented in Table 2. Six percent of respondents were missing a baseline data element but were retained for analysis through the use of multiple imputation. Table 2 presents

Table 1. Baseline Characteristics by Receipt of NRT in Hospital

Characteristic	Received NRT in hospital		Total, N = 1,895	p value
	No, N = 729	Yes, N = 1,166		
Male (%)	51	56	54	.04
Age (M)	52	52	52	.73
Cig/day (median, IQR)	15 (7–20)	20 (10–25)	20 (10–20)	<.001
Prior use of NRT (%)	47	54	51	.003
Intend to quit (%)	32	27	29	.01
LOS (median, IQR)	4 (3–7)	5 (3–7)	4 (3–7)	.003
Cardiac service (%)	28	31	30	.24
Counseling minutes (median, IQR)	22 (20–30)	25 (20–30)	25 (20–30)	<.001

Note. IQR = interquartile range; LOS = length of stay; NRT = nicotine replacement therapy.

ARRs for NRT use after hospital discharge by NRT use before discharge (before hospitalization, during hospitalization, or both). Use of NRT prior to admission was associated with a doubling in the rate of postdischarge NRT use, while use during the admission was associated with a fourfold increase. Female gender, smoking ≥ 10 cig/day, and duration of inpatient counseling were independently associated with higher rates of post-discharge NRT use. Increasing LOS was associated with reduced likelihood of NRT use after discharge.

Discussion

We followed a large sample of hospitalized smokers who were routinely referred for consultation with a tobacco treatment counselor following standard hospital practice. More than half the participants (62%) received NRT during their stay and those who did were more likely to use it after discharge than those who did not receive NRT while in hospital.

We observed a higher rate of NRT use among hospitalized smokers than several earlier published estimates of less than

10% (Emmons et al., 2000; Rigotti et al., 1999). A recent study of an inpatient tobacco treatment program reported that 40% of patients referred to the program received pharmacotherapy, most of which was NRT (Faseru et al., 2011). That finding, together with our results, suggests a secular trend toward increasing NRT use in U.S. hospitals, possibly in response to the adoption in 2004 of a tobacco measure in the National Hospital Quality Measures (The Joint Commission, 2008). The high rate at our hospital may be due in part to the presence of a computerized order entry system that assists the admitting physician in placing NRT orders and automatically requests tobacco treatment consultations for smokers.

Several baseline characteristics were associated with using NRT while hospitalized, particularly heavier smoking, and previous experience with the medication. Not surprisingly, these factors have also been associated with choosing to use NRT as a cessation aid (Klesges et al., 2007; Shiffman, Di Marino, & Sweeney, 2005). Inpatients who received NRT in hospital had longer LOS than those who did not, which may reflect increasing need for withdrawal symptom relief or greater opportunity to provide the medication during a longer stay.

Table 2. NRT Use in First Two Weeks After Hospital Discharge by NRT Use Before Discharge

Factor	N	NRT use after discharge	
		Percent using NRT	Adjusted rate ratio ^a (95% CI)
NRT use before discharge			
Never used NRT	269	10	1.00
Prior to hospitalization only	231	24	2.16 (1.42–3.27)
During hospitalization only	360	51	4.68 (3.25–6.73)
Both prior to and during hospitalization	433	64	5.64 (3.95–8.05)
Cig/day ≥ 10	1,058	46	1.40 (1.12–1.70)
Intend to quit	415	41	1.10 (0.98–1.25)
Cardiac service	435	44	1.01 (0.89–1.14)
Counseling >25 min	515	51	1.24 (1.10–1.39)
Female	581	44	1.19 (1.06–1.34)
Length of stay (log units)			0.84 (0.77–0.92)
Age (in decades)			0.99 (0.95–1.04)
Total	1,293	42	

Note. NRT = nicotine replacement therapy.

^aAdjusted for all other factors in the table.

Follow-up revealed that more than 40% of participants used NRT at home within 2 weeks after discharge, a substantially higher rate than in previous studies (Bansal, Cummings, Hyland, & Giovino, 2004; Burns & Levison, 2008; Pierce & Gilpin, 2002; Solberg et al., 2001). This rate of NRT use is notable because the participants had not actively sought tobacco treatment but instead comprise a series of patients who were seen in an effort to offer counseling to all inpatients who smoke. NRT use after discharge was more than four times higher for those who had used NRT while hospitalized compared with those who had never used it before.

These findings support the notion that receiving NRT in an inpatient setting, combined with counseling, encourages patients to use NRT after discharge. A history of having used NRT prior to admission was associated with a greater likelihood of NRT use after hospitalization, but this effect was small relative to the increase in NRT use at home reported by those who used NRT during the admission itself. It is possible that using NRT while hospitalized provides patients with recent direct experience with the medication, coupled with personally tailored advice and assurance that the medication is safe to use, thus forming a powerful inducement to use it in an attempt to quit smoking.

Limitations

This observational study has several limitations. It was conducted in a single large academic medical center, which may limit the generalizability of our findings. Patients were not randomly assigned to use NRT in hospital, which would be unethical in this setting where offering NRT to smokers as a comfort measure is standard care. As a result, self-selection bias is likely. Patients reporting NRT use after discharge were not asked whether they were using the medication to help them quit smoking. It is possible that some of the postdischarge NRT use we observed did not represent efforts to stop smoking permanently.

Conclusions

Using NRT while hospitalized appeared to encourage patients to use NRT at home after discharge. Providing NRT in addition to counseling for smokers while hospitalized may promote smoking cessation by encouraging the use of this medication after discharge.

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Declaration of Interests

NAR has received research grant funding from Pfizer, Sanofi-Aventis, and Nabi Biopharmaceuticals for the study of investigational and/or marketed smoking cessation products. She has received fees for consultation about smoking cessation from Pfizer (prior to July 2008) and Free & Clear, Inc. (prior to February 2009).

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